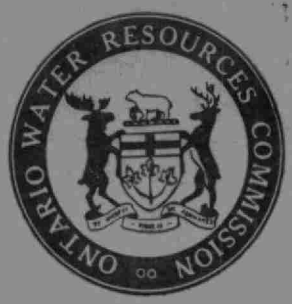

THE

ONTARIO WATER RESOURCES

COMMISSION

WATER POLLUTION SURVEY

of the

VILLAGE OF CHALK RIVER

COUNTY OF RENFREW

1968

THE ONTARIO WATER RESOURCES COMMISSION

REPORT ON

A

WATER POLLUTION SURVEY

OF THE

VILLAGE OF CHALK RIVER

IN THE

COUNTY OF RENFREW

1968

DIVISION OF SANITARY ENGINEERING

DISTRICT ENGINEERS BRANCH

WATER POLLUTION SURVEY

OF THE

VILLAGE OF CHALK RIVER

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APPENDICES

WATER POLLUTION SURVEY

OF THE

VILLAGE OF CHALK RIVER

INTRODUCTION

A water pollution survey of the Village of Chalk River was performed on July 12, 1967. Water pollution surveys are made by the Commission for the purpose of locating and recording sources of existing and potential water pollution. Where pollution sources are noted, recommendations are made concerning their abatement to the parties concerned.

The appendices to this report include an interpretation of the various tests performed on the samples, a tabulation of the sample results, a summary of methods of financing water and sewage works programmes and a map of the village showing the sampling point locations. A section has also been included on effective community planning through an official plan.

INTERVIEWS WITH OFFICIALS

Discussions were held with the following officials during the survey.

Mr. J. A. G. Severin, Public Health Inspector,
Mr. G. Shultz, Water Works Operator.

VILLAGE OF CHALK RIVER

Chalk River is located on Highway No. 17, twenty-two miles west of Pembroke and six miles from the Atomic Energy of Canada Plant. It is also a Division Point on the main Transcontinental line of the Canadian Pacific Railway in the County of Renfrew. The 1967 Municipal Directory indicates that the population of the village is 1060. The population over the past 10 years has remained relatively static. The area of the municipality is approximately 540 acres.

WATER USES

Municipal

Corry Lake is the source of the water supply for the Village of Chalk River. The water works was owned by the Canadian Pacific Railway until 1964, at which time it was taken over as an Ontario Water Resources Commission water works project. This water system consists of a pumphouse including pumping, chlorination and metering equipment, and a 60,000 US gallon elevated storage tank. The system serves approximately 80% of the residences in the municipality as well as the railway terminal.

Private

Individual well supplies are employed at private dwellings located in areas of the village not served by the municipal supply.

SEWAGE DISPOSAL FACILITIES

In the absence of a municipal sewage works, most of the premises are served by sub-surface disposal systems. Although sandy soil conditions are prevalent in the village, the drainage for this type of system is not good due to the high water table in the area. The provision of private sewage disposal in older premises without inspection has resulted in inadequate systems. These conditions have resulted in some sewage flows gaining access to watercourses within the village.

PROPOSED SEWAGE WORKS

In order to rectify the existing inadequate disposal systems and also to adequately accommodate future growth i.e. residential, commercial and industrial, it will be necessary to develop a communal sewage works. The municipal officials of the Village of Chalk River have made an application to the Ontario Water Resources Commission for a provincially-owned sewage works project. This Commission has agreed

to present a proposal to the village regarding a provincially financed project.

SURFACE WATER DRAINAGE

Due to the topographical features of the village, surface run-off flows tend to drain to Duck Lake, Duck River, Corry Lake and their contributaries through the village. A creek known locally as Orange Hall Creek which flows in a northerly direction through the village to Duck Lake, drains much of the western part of the village.

MUNICIPAL REFUSE DISPOSAL SITE

The site utilized by the village for refuse disposal is located approximately 1.5 miles north of the municipality and remote from any watercourse. The refuse is burned at the disposal site.

DISCUSSION OF LABORATORY ANALYSES

The locations of sampling points are shown on the appended map of the Village of Chalk River. Samples were collected at pertinent points in order to assess the influence of waste flows on the receiving streams.

The bacteriological examinations and chemical analyses of samples from this survey were performed at the

Ontario Water Resources Commission Laboratory in Toronto. The results of the laboratory analyses and an explanation of their significance are included in the appendices.

(I) SAMPLE POINT NO. DESCRIPTION

2 Orange Hall Creek at Main Street

The appearance and excessive number of coliform organisms in the sample from this location confirm contamination, which appears to originate from malfunctioning septic tank systems along Orange Hall Creek within the village.

(II) SAMPLE POINT NO. DESCRIPTION

4 Drain from CPR shops

The flow in this drain was completely absorbed in the area north of Corry Lake at the time of this inspection. Storm and wash water from the CPR shops comprise the flow in this drain. During periods of heavy surface run-off, this flow may gain access to the lake.

(III) SAMPLE POINT NO. DESCRIPTION

5 Duck Creek at Ottawa Street

The coliform concentration in this sample was high. This suggests that there are sources of pollution in the area.

SUMMARY AND CONCLUSIONS

A water pollution survey was undertaken in the Village of Chalk River by the Ontario Water Resources Commission with a field investigation on July 12, 1967.

The sample results indicate that domestic wastes were gaining access to the watercourses within the municipality. These results confirm the need for improved sewage treatment. In order to adequately accommodate future growth, i.e. residential, commercial and industrial, it will be necessary to develop a communal sewage works.

The municipal officials of the Village of Chalk River have realized the need for a sewage system. At present a provincially-financed sewage works programme is being developed to serve the needs of the Village of Chalk River.

PREPARED BY: L. E. Murray

L. E. Murray,
Civil Technologist,
Division of Sanitary Engineering

dlm

APPENDIX

TABLE I

Significance of Laboratory Analyses

Bacteriological Examination

The presence of coliforms indicates pollution from human or animal excrement, or from some non-faecal forms. The objective for surface water quality in Ontario is a maximum of 2400 organisms per 100 millilitres.

The OWRC Laboratories employ the Membrane Filter (MF) technique of examination to obtain a direct enumeration of coliform organisms. The Department of Health Laboratories use the Most Probably Number (MPN) enumeration and coliform counts are reported as Total Coliform Organisms (TC) and Faecal Coliform Organisms (FC).

Sanitary Chemical Analyses

Biochemical Oxygen Demand (BOD)

Biochemical Oxygen Demand is reported in parts per million (ppm) and is an indication of the amount of oxygen required for the stabilization of decomposable organic or chemical matter in water. The completion of the laboratory test required five days, under the controlled incubation temperature of 20^{o} Centigrade.

The OWRC objective for surface water quality is an upper limit of four (4) ppm.

Solids

The value for solids, expressed in parts per million (ppm)

is the sum of the values for the suspended and the dissolved matter in the water. The concentration of suspended solids is generally the most significant of the solids analyses with regard to surface water quality.

The effects of suspended solids in water are reflected in difficulties associated with water purification, depositions in streams and injury to the habitat of fish. Where suspended solids values are less than 20 ppm, laboratory difficulties are experienced and the turbidity is determined instead.

Turbidity

Turbidity is caused by the presence of suspended matter, such as clay, silt, finely divided organic matter, plankton and other microscopic organisms in water. It is an expression of the optical property of a sample and the results are reported in "turbidity units".

Physical Determinations

Dissolved Oxygen

The amount of dissolved oxygen contained in unpolluted water fluctuates with the temperature. A deficiency of oxygen in water is replaced by oxygen from the atmosphere. There is a saturation value for each temperature. At 18° C this is 9.54 ppm of dissolved oxygen. Values below the saturation level indicate the presence of polluting organic substances which are absorbing oxygen from the water. The extent of this deficiency is one index of the

degree of organic pollution. Substantial reduction in dissolved oxygen causes suffocation of fish.

Temperature

The temperature of water influences the solubility of oxygen and the rate of oxidation and purification.

APPENDIX

TABLE II

Nitrogen

Ammonia Nitrogen (Free Ammonia) is the soluble product in the decomposition of nitrogenous organic matter. It is also formed when nitrates and nitrites are reduced to ammonia either biologically or chemically. Some small amounts of ammonia, too, may be swept out of the atmosphere by rain water.

The following values may be of general significance in appraising free ammonia content: Low 0.015 to 0.03; moderate 0.03 to 0.10 ppm; high 0.10 or greater.

Total Kjeldahl is a measure of the total nitrogenous matter present except that measured as nitrite and nitrate nitrogens. The Total Kjeldahl less the Ammonia and organic nitrogen determinations are important in determining the availability of nitrogen for biological utilization. The normal range for Total Kjeldahl would be 0.1 to 0.5 ppm.

Nitrite Nitrogen

Nitrite is usually an intermediate oxidation product of ammonia. The significance of nitrites, therefore, varies with their amount, source and relation to other constituents of the sample, notably the relative magnitude of ammonia and nitrate present. Since nitrite is rapidly and easily converted to nitrate, its presence in concentrations greater than a few thousandths of a part per million is generally indicative of active biological processes in the water.

Nitrate Nitrogen

Nitrate is the end product of aerobic decomposition of nitrogenous matter, and its presence carries this significance. Nitrate concentration is of particular interest in relation to the other forms of nitrogen that may be present in the sample. Nitrates occur in the crust of the earth in many places and are a source of its fertility.

The following ranges in concentration may be used as a guide. Low, less than 0.1 ppm; moderate, 0.1 to 1.0 ppm; high, greater than 1.0 ppm.

Phosphorus

Total Phosphorus

Total phosphorus is a measure of both the organic and inorganic forms of phosphorus present.

Soluble Phosphorus is a measure of the orthophosphate only and when subtracted from the total phosphorus given an indication of the concentration of organic phosphorus present. That is, the soluble phosphorus is a measure in the form of polyphosphate, which, however, in surface waters is usually insignificant. Inorganic phosphorus in concentration in excess of 0.01 ppm may cause nuisance conditions.

Anionic Detergents (ABS)

The presence of anionic detergents as ABS is an indication that domestic waste is present.

Phenols

The presence of phenol or phenolic equivalents is generally associated with discharges containing petroleum products, or with wastes from some industries. It is generally conceded that adequate protection of surface waters will be provided if the concentration of phenols in waste discharges does not exceed 20 parts per billion (ppb). Phenolic type waste can cause objectionable conditions in water supplies and might taint the flesh of fish.

APPENDIX

IMPLEMENTATION OF WATER AND SEWAGE WORKS PROGRAMS

Currently, there are three general methods which may be utilized for implementing sewage and water works programs. These are: 1) to enter into an agreement with the OWRC for the construction of the treatment and collector works with an obligation to pay the debt retirement and operating charges over the term of the agreement with the facility reverting to the municipality at the end of the term of the agreement, 2) by requesting the provision of service from a Provincially-owned project, and 3) by proceeding with the construction independently and meeting capital costs by the sale of debentures.

OWRC/MUNICIPAL PROJECTS

For the construction of water and sewage works under agreement with this Commission, the works are provided and developed under Sections 39 to 46 of the Ontario Water Resources Commission Act.

For this type of arrangement, the Commission utilizes a sinking fund and consequently the annual payments are based on a specific debt retirement period and the payments are unchanged for the period of the agreement. This type of project may be financed over a period of time up to a maximum of thirty years. The annual charges for projects constructed under this agreement are determined as follows:

1. Capital Repayment

   As noted, OWRC financing is by the sinking fund method and an annual payment of approximately 2 per cent of the capital

cost is required to retire a debt over a thirty-year period.

2. Interest

On new Commission projects, interest is calculated at the current rate.

3. Reserve Fund

To provide money for repairs and replacements, Section 40 of The Ontario Water Resources Commission Act provides for the establishment of a reserve fund by the Commission. It is important to note that this fund is established in the name of the municipality and the balance consequently earns interest. It has now been established by Commission minute that the reserve fund billing for each project shall continue only until the fund reaches an amount of ten times the initial annual billing and the reserve fund billing shall be re-imposed only when the fund has been depleted to 80 per cent or less of the maximum amount.

4. Operating Costs

Under OWRC agreement, the municipality is responsible only for the operating costs directly attributed to the project in the municipality. Therefore, no charges are made by the Commission for the services of head office personnel who are available as required to advise on the satisfactory operation and maintenance of the project.

PROVINCIALLY-OWNED WORKS

In June, 1967, the Honourable J. R. Simonett, Minister of Energy and Resources Management, made an announcement which expanded the authorization of this Commission for the provision of water supply and sewage treatment facilities. This new program allows the Commission to construct entire water and sewage works facilities for small municipalities. The capital costs of these can be amortized over a 40 year period.

A slight variation of this program could be implemented in that the municipality may request that this Commission provide only the major water and sewage works facilities as Provincially-owned works, and develop the water distribution and sewage collector systems under the standard type of Commission project. It would appear that where applicable, it would be more advantageous for the municipality to proceed on the basis of requesting this Commission to develop entire systems as Provincially-owned works.

The associated cost of supplying these works, including amortization of capital costs, together with operating and maintenance charges, will be recovered by the sale of service to the affected municipalities by rates determined on a usage basis. These facilities will be wholly-owned by the Province of Ontario and the arrangements for service will be formalized by contracts between the Commission and the municipality concerned. The installations will be operated entirely at cost with appropriate provision for adjustment in rate.

DEVELOPMENT

If a municipality, after considering the alternatives, wishes this Commission to consider Provincially-financed projects, application forms should be completed and submitted together with a resolution of the Municipal council. A draft of the suggested wording of the resolution is included with the application forms.

If the proposed works are to be built by the municipality on its own initiative or as a formal project under agreement with this Commission, it is required that the Council retain a consulting engineer to prepare preliminary engineering reports on the proposed work. If a Provincial system is contemplated, no action should be taken with respect to retaining a consulting engineering firm as the Commission will designate a consulting engineer to carry out the Provincial portion of the work and it would be advantageous if the municipal portion be studied and reported on by the same engineer.

APPENDIX

COMMUNITY PLANNING

The need for effective planning has become more important today than ever before. Municipalities are being burdened with the rising costs of land and labour. Therefore, any project a community hopes to develop should be based on sound planning. Planning at all levels of government is essential but, community planning can be most effective if interest and initiative is generated at the local level. The enormous benefits accrued as a result of good planning can more than compensate for the initial investment.

Community planning can be described as an effort to control and direct development effectively. This can best be achieved through the development of an official plan. An official plan is the stated intention of the local authorities with respect to orderly development within the planning area, that is prepared and set forth with professional assistance and meets the requirements as set out by the Provincial Planning Act. An official plan can be a joint effort by a number of municipalities which have common basic characteristics and common problems, or one municipality can establish a plan on its own initiative.

Orderly development yields future economy in services. Development in the community can be retarded where an official plan does not exist. A plan provides, among other things, the framework for the rational design of water and sewage works and also the extensions of mains and collector sewer systems.

A local council having decided to proceed with a programme of community planning definitely should contact the Ontario Department of Municipal Affairs. Through its many branches, information and guidance is provided to all interested parties.

VILLAGE OF CHALK RIVER

AS OF July 12, 1967

SAMPLING POINT NO.	DESCRIPTION	5-DAY BOD	SOLIDS			NITROGEN AS N				ANIONIC DETERGENTS AS ABS	MF COLIFORM COUNT/ 100 ml	PHENOLS in ppb
			TOTAL	SUSP	DISS	FREE AMMONIA	TOTAL KJELDAHL	NIT-RITE	NIT-RATE			
1	Orange Hall Creek - entering Village	1.4	144	5	139	0.13	2.10	0.20	0.35	0.0	310	6
2	Orange Hall Creek at Main Street	2.8	156	24	132	0.10	2.30	0.22	0.24	0.1	11,900	8
3	Laws Creek at Street D	4.2	164	12	152	0.13	2.60	0.00	0.20	0.1	1,200	10
4	Ditch from CPR Shops	8.6	76	22	54	0.85	2.80	0.00	0.23	0.1	110	10
5	Duck Creek at Ottawa Street	1.8	138	3	135	0.12	1.80	0.00	0.12	0.1	4,700	8

All analyses reported in ppm unless otherwise indicated.

DUCK LAKE

VILLAGE BOUNDARY

HWY. No. 17

SYDNEY ST.

OTTAWA ST.

PINE ST.

DUCK ST.

SPRUCE ST.

CANADIAN PACIFIC RAILWAY

CR.

ORANGE HALL CR.

LAWS CR.

JOSEPH ST.

ELIZABETH ST.

ALBERT ST.

PETER ST.

CONCESSION RD.

MAIN ST.

GEORGE ST.

STATION ST.

MARY ST.

ONTARIO ST.

CHURCH ST.

ALGOMA ST.

QUEBEC ST.

MEEKER ST.

WILSON ST.

D STREET

VILLAGE BOUNDARY

CHALK RIVER PUMP HOUSE

LEGEND

(5) — SAMPLING POINT

ONTARIO WATER RESOURCES COMMISSION

VILLAGE OF CHALK RIVER

WATER POLLUTION SURVEY

1968

SCALE: 400 200 0 400 FEET	
DRAWN BY: L. L. BROOME	DATE: FEBRUARY, 1968
CHECKED BY: L. E. M.	DRAWING No. 68-17